

while moderate northwest gales also occurred in the vicinity of the Azores, accompanied by comparatively high barometric readings. On the 2d the conditions had changed but little since the previous day, although on the 2d and 3d the winds in the vicinity of the Azores had increased in force, while on the 2d the barometer at Horta read 30.52 inches.

On the 5th there was a comparatively shallow depression over the Bermudas that afterwards deepened, and on the 6th moderate to strong gales prevailed between the fifty-fifth and seventieth meridians.

On the 8th a Low was central near Cape Race, Newfoundland, that moved slowly northeastward, reaching its greatest intensity on the 10th when central near 55° N., 57° W., where westerly winds of force 8 to 10 were reported from the southerly quadrants. Continuing in its easterly course this disturbance was off the coast of Europe on the 13th, the storm area then extending from the fiftieth to sixtieth parallels. On the 14th the center was over the North Sea, and while it had decreased in extent and intensity, moderate northwesterly gales were still reported by a number of vessels.

On the 14th Hatteras was near the center of a depression that developed into a severe disturbance as it moved northeastward. On the 15th the center was about 150 miles south of Sable Island, where a barometric reading of 28.98 inches was recorded, and strong to whole gales occurred as far south as the thirty-fifth parallel. On the 16th and 17th this Low was over the middle and eastern

sections of the northern steamer lanes, respectively, and on the latter date winds of hurricane force were encountered, as shown by reports in table of storms.

On the 18th northerly gales were reported from a limited area between the seventieth meridian and American coast, between Hatteras and Nantucket, and on the same day there was also a moderate disturbance central near 50° N., 25° W.

A Low that was central near 42° N., 52° W., on the 19th moved rapidly northeastward, increasing in intensity and resulting in moderate to strong gales over the middle section of the steamer lanes from the 20th to 22d. This was followed by another Low that on the 23d was central about 300 miles east of the Virginia Capes, with winds of force 7 near the center; by the 24th the storm area had increased in intensity and extent, and by the 25th strong to whole gales prevailed between the thirty-fifth and fortieth parallels and the fifty-fifth and sixty-fifth meridians.

Charts VIII to XI cover the period from the 26th to 29th, inclusive, and show the progress of this disturbance, as well as that off the coast of Europe.

On the 31st a Low, central about 250 miles south of Newfoundland, was responsible for heavy weather between that locality and the Bermudas, and on the same day a second disturbance was central near 48° N., 30° W., with westerly winds of nearly hurricane force in the southerly quadrants.

OCEAN GALES AND STORMS, DECEMBER, 1930

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Highest force of wind and direction	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN													
Iowan, Am. S. S.	New York	Canal Zone	35 42 N	74 28 W	Dec. 1	2 a, 1.	Dec. 1	29.88	S.	S, 7.	SW.	S, 10.	Steady.
Lucia C, Ital. S. S.	Baltimore	Gibraltar	37 17 N	19 58 W	Dec. 1	11 p, 2.	Dec. 4	29.97	NW.	NNE, 10.	NNE.	NNE, 11.	
Tiger, Nor. S. S.	Oslo	New York	45 45 N	54 24 W	Dec. 2	Noon, 2.	Dec. 3	29.54	SSW.	SW, 9.	NW.	W, 10.	SSW-NW.
Saccarappa, Am. S. S.	Bremen	Charleston	34 40 N	62 00 W	Dec. 6	10 p, 6.	Dec. 8	29.37	SE.	SE, 8.	NW.	—, 10.	SE-SW.
Winnebago, Br. S. S.	Manchester	Philadelphia	48 10 N	50 30 W	Dec. 9	4 p, 9.	Dec. 11	28.79	SSW.	SW, 9.	W.	SW, 10.	SSW-W.
Sagaporack, Am. S. S.	Copenhagen	Portland, Me.	53 53 N	38 00 W	Dec. 6	—, 10.	Dec. 15	28.90	WNW.	WSW, 7.	NNW.	—, 10.	SW-W.
Malne, Dan. S. S.	Newcastle	do.	58 20 N	15 30 W	Dec. 12	3 a, 13.	Dec. 18	28.49	WNW.	WNW, 9.	NW.	—, 12.	WSW-WNW.
Barendrecht, Du. S. S.	Charleston	London	35 55 N	72 35 W	Dec. 14	11 a, 14.	Dec. 16	29.30	ESE.	NE, 10.	N.	NW, 12.	ESE-NW.
Victrolite, Br. M. S.	Halifax	Cartagena	37 40 N	64 34 W	Dec. 14	8 p, 14.	Dec. 15	28.50	E.	N, 5.	NW.	NW, 10.	N-NW.
Ponce, Am. S. S.	San Juan	New York	36 10 N	72 30 W	Dec. 14	—, 15.	Dec. 15	28.98	SE.	NW, 12.	NW.	—, 12.	SE-NW.
Pennsylvania, Du. S. S.	Newport News.	Rotterdam	45 40 N	44 30 W	Dec. 15	2 p, 15.	Dec. 16	29.31	SE.	SSE, 8.	WSW.	SW, 10.	S-SSW.
Tiger, Nor. S. S.	New York	Bergen	53 01 N	41 30 W	Dec. 15	Noon, 16.	Dec. 17	28.47	SE.	SSW, 10.	WSW.	SSW, 12.	SSE-SSW.
Minnesotan, Am. S. S.	do.	Canal Zone	36 08 N	73 40 W	Dec. 17	9 p, 17.	Dec. 18	29.64	E.	SE, 10.	NNW.	SE, 10.	
Bergensfjord, Nor. S. S.	Bergen	New York	56 47 N	30 00 W	Dec. 16	4 a, 17.	Dec. 17	28.85	SSW.	SW, —.	WSW.	SW, 11.	SSW-WSW.
Barendrecht, Du. S. S.	Charleston	London	40 22 N	53 14 W	Dec. 19	10 a, 19.	Dec. 19	29.54	S.	W, 7.	NNW.	N, 12.	S-W-N.
Cingalese Prince, Br. M. S.	Port Said	Boston	42 30 N	45 54 W	Dec. 19	9 p, 19.	Dec. 20	29.71	SE.	SW, 10.	NW.	SW, 10.	SW-WSW.
Sarcoux, Am. S. S.	New York	Havre	44 30 N	55 11 W	Dec. 20	—, 21.	Dec. 21	29.87	SE.	S, 8.	S.	SSE, 10.	SE-S.
Malne, Dan. S. S.	Newcastle	Portland, Me.	51 10 N	44 10 W	Dec. 22	8 a, 22.	Dec. 23	29.68	NW.	NW, 9.	NW.	—, 11.	
Dordrecht, Du. S. S.	Bay Town	Manchester	33 54 N	74 39 W	Dec. 22	Midt, 22.	Dec. 25	29.90	NW.	NW, 9.	NNW.	NW, 10.	
Nubian, Br. S. S.	Liverpool	Boston	53 00 N	29 00 W	Dec. 25	4 a, 25.	Dec. 25	29.18	WSW.	—, 10.	W.	—, 12.	WSW-W.
Tulsa, Am. S. S.	Savannah	Liverpool	48 06 N	32 57 W	Dec. 26	6 a, 26.	Dec. 26	29.02	SW.	WSW, 12.	WNW.	WSW, 12.	WSW-WNW.
West Kedron, Am. S. S.	Africa	Philadelphia	36 32 N	64 57 W	Dec. 27	10 p, 27.	Dec. 27	29.28	S.	SW, 10.	NW.	NNW, 11.	W-SW.
Persephone, Danz. S. S.	Baytown	Denmark	48 00 N	41 28 W	Dec. 27	7 p, 27.	Dec. 28	29.76	WSW.	W, 11.	NNW.	NNW, 11.	WSW-NNW.
Gonzenheim, Ger. S. S.	Galveston	Bremen	41 34 N	48 24 W	Dec. 27	5 p, 28.	Dec. 29	29.32	S.	SW, 7.	W.	S, 12.	
Nubian, Br. S. S.	Liverpool	Boston	47 30 N	46 40 W	Dec. 28	4 a, 29.	Dec. 29	29.14	WSW.	—, 10.	WSW.	—, 12.	Steady.
Ensley, City Am. S. S.	do.	Baltimore	36 31 N	71 39 W	Dec. 30	Noon, 30.	Dec. 31	29.46	W.	W, 6.	NW.	WNW, 10.	W-WNW.
Quaker City, Am. S. S.	Hull	Philadelphia	51 32 N	1 50 E	Dec. 30	2 p, 30.	Dec. 31	29.19	SSW.	—, 7.	N.	W, 12.	
Coldwater, Am. S. S.	Antwerp	Charleston	33 10 N	59 15 W	Dec. 27	6 a, 31.	Dec. 31	29.59	S.	S, 8.	NW.	—, 11.	S-W.
Emile Franquil, Belg. S. S.	do.	New York	48 20 N	29 45 W	Dec. 31	4 a, 31.	Dec. 31	28.91	W.	W, 5.	W.	W, 11.	
Samland, Belg. S. S.	do.	do.	43 15 N	50 03 W	Dec. 31	10 p, 31.	Jan. 1	28.90	WNW.	WNW, 9.	WNW.	NW, 11.	WNW-NW.

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Highest force of wind and direction	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH PACIFIC OCEAN													
Silverbelle, Br. M. S.	Manila	San Francisco	36 50 N	173 45 W	Dec. 1	8 a, 1	Dec. 1	29.86	NW	WNW, 7	NW	NW, 9	Steady.
Oregon, Am. S. S.	Otaru	do	45 58 N	151 54 W	Dec. 1	2 p, 2	Dec. 3	28.65	E	W, 5	SW	SE, 9	E-S-SW.
Admiral Farragut, Am. S. S.	Kodiak	Seattle	58 00 N	151 00 W	Dec. 2	—, 3	Dec. 3	28.78	NE	NNE, 9	NE	NNE, 9	NE-NNE.
Hakubasan Maru, Jap. M. S.	Yokohama	San Francisco	46 50 N	155 00 W	Dec. 2	8 a, 2	Dec. 3	28.76	NW	S, 6	S	W, 9	NE-S-NE.
Michigan, Am. S. S.	Portland, Oreg.	The Orient	47 10 N	164 00 E	Dec. 2	2 p, 2	Dec. 5	29.26	WSW	WSW, 8	W	W, 9	WSW-W.
Everett, Am. S. S.	Zamboanga, P. I.	San Francisco	45 07 N	171 30 E	Dec. 4	11 p, 4	Dec. 6	29.35	SW	NW, 8	NW	W, 9	SW-NW.
Oregon, Am. S. S.	Otaru	do	45 14 N	141 30 W	Dec. 4	8 p, 4	Dec. 5	29.21	S	S, 9	W	W, 9	S-SW-W.
Olympia, Am. S. S.	do	do	42 25 N	176 30 W	Dec. 4	2 a, 5	Dec. 6	29.15	W	W, 8	W	W, 10	Steady.
Wisconsin, Am. S. S.	Portland, Oreg.	Shanghai	49 00 N	169 00 E	Dec. 4	4 a, 4	Dec. 7	28.78	NNW	NNW, 7	NW	NW, 9	N-W-NW.
Stuart Dollar, Am. S. S.	Tabaco, P. I.	Los Angeles	37 15 N	168 25 E	Dec. 5	1 p, 5	Dec. 6	29.51	NW	NW, 7	NW	NW, 9	NW-NNW.
Tamaha, Br. S. S.	Shanghai	San Pedro	38 38 N	172 50 W	Dec. 5	10 p, 7	Dec. 8	29.11	W	W, 12	NW	W, 12	SW-W-NNW.
Mojave, Am. S. S.	San Pedro	Nagasaki	30 14 N	158 26 E	Dec. 6	10 p, 6	Dec. 7	29.73	SE	SE, 8	SW	SW, 9	SW-W.
Maliko, Am. S. S.	Puget Sound	Hawaiian Islands	35 30 N	143 00 W	Dec. 6	10 p, 10	Dec. 12	29.68	SSE	SSW, 7	W	W, 10	SSW-SW.
Stuart Dollar, Am. S. S.	Tabaco	Los Angeles	40 42 N	170 30 W	Dec. 7	Mdt, 8	Dec. 8	28.43	SE	WSW, 7	NW	NW, 11	SSW-WSW.
Illinois, Am. S. S.	Hong Kong	San Francisco	41 15 N	155 20 E	Dec. 10	2 a, 11	Dec. 11	29.09	ENE	NE, 9	NNW	N, 10	NE-N.
Pres. Taft, Am. S. S.	Yokohama	do	34 45 N	153 05 E	Dec. 10	4 p, 10	Dec. 12	29.40	SSW	SW, 7	NW	W, 9	SSE-SW.
Columbia Maru, Jap. M. S.	do	Seattle	41 30 N	166 45 E	Dec. 10	6 p, 11	Dec. 12	28.92	SE	NE, 4	N	N, 9	SE-S-N.
Shiraha Maru, Jap. S. S.	Milke	Coos Bay	49 54 N	151 42 W	Dec. 10	Noon, 11	Dec. 15	29.10	NNW	WNW, 6	W	SW, 10	NW-SW-WSW.
Pres. Jackson, Am. S. S.	Yokohama	Seattle	49 40 N	133 30 W	Dec. 11	5 p, 11	Dec. 11	29.30	SE	SE	SE	SE, 10	Steady.
Dorothy Alexander, Am. S. S.	Seattle	San Diego	43 23 N	124 42 W	Dec. 12	2 a, 12	Dec. 12	29.65	SE	SE, 7	SW	SE, 9	SE-SSE-S.
Steel Trader, Am. S. S.	Honolulu	Yokohama	29 45 N	151 49 E	Dec. 13	—, 13	Dec. 13	29.79	W	W, 9	W	W, 9	W-N.
Illinois, Am. S. S.	Hong Kong	San Francisco	44 04 N	168 56 E	Dec. 14	6 p, 14	Dec. 16	29.17	S	SW, 7	SW	W, 10	S-SW-W.
Proteslaus, Br. S. S.	Yokohama	Victoria	45 05 N	161 46 E	Dec. 14	Noon, 14	Dec. 16	29.66	NW	NW, 9	WNW	WNW, 10	SW-NNW.
Columbia Maru, Jap. M. S.	do	Seattle	49 25 N	159 30 W	Dec. 15	4 p, 16	Dec. 16	29.35	SSW	SW, 10	WSW	SW, 10	SW-SSW-SW.
Steel Trader, Am. S. S.	Honolulu	Yokohama	31 55 N	142 47 E	Dec. 15	—, 15	Dec. 15	29.97	WNW	—, 9	WNW	WNW, 9	WNW-N.
Manoa, Am. S. S.	do	San Francisco	36 15 N	127 05 W	Dec. 16	8 a, 17	Dec. 17	30.32	NNW	NNW, 8	NNW	NNW, 9	Steady.
Columbian, Am. S. S.	Los Angeles	Balboa	10 05 N	85 32 W	Dec. 16	—, 17	Dec. 17	29.91	ENE	NE, 8	NE	NE, 8	E-NNE-NE.
City of Elwood, Am. S. S.	Shanghai	San Pedro	47 06 N	171 00 W	Dec. 17	11 p, 18	Dec. 19	29.04	SE	WSW, 10	W	SW, 10	SSW-W.
Pres. McKinley, Am. S. S.	Yokohama	Seattle	42 20 N	153 55 E	Dec. 19	6 a, 20	Dec. 20	29.22	WSW	SE, 9	WSW	SE, 9	SE-SSE.
Japan Arrow, Am. S. S.	San Pedro	Balboa	15 38 N	98 32 W	Dec. 23	1 a, 24	Dec. 24	29.89	NE	NE, 9	NW	NNE, 10	NE-NNE.
Mojave, Am. S. S.	Yokohama	San Pedro	38 24 N	171 27 E	Dec. 23	6 a, 25	Dec. 29	29.47	NW	S, 8	WNW	WNW, 11	NW-S-NNW.
Kansan, Am. S. S.	Los Angeles	Balboa	9 27 N	87 01 W	Dec. 23	4 p, 24	Dec. 24	29.72	E	NE, 8	NE	NE, 8	E-NE-S.
Ohioan, Am. S. S.	New York	Los Angeles	41 45 N	153 30 W	Dec. 24	4 p, 24	Dec. 24	29.87	WNW	N, 10	NE	WNW, 11	NNW-N-NE.
City of San Francisco, Am. M. S.	San Pedro	Balboa	15 45 N	95 30 W	Dec. 29	2 p, 29	Dec. 29	29.98	N	NNE, 9	NW	NNE, 9	N-NE-NW.
Golden River, Am. S. S.	Hong Kong	San Francisco	35 08 N	156 10 W	Dec. 30	2 p, 30	Dec. 30	29.89	WNW	WNW, 9	WNW	WNW, 10	Steady.
Diana Dollar, Am. S. S.	Tabaco	Los Angeles	41 09 N	174 40 W	Dec. 30	Noon, 30	Jan. 4	29.24	SW	SSE, 10	W	W, 10	SW-W-SSE.
SOUTH ATLANTIC OCEAN													
Brookwood, Br. S. S.	Port Natal	Swansea	33 30 S	27 50 E	Dec. 2	2 a, 2	Dec. 2	29.73	SW	SW, 8	WSW	SW, 9	ENE-S-SW.

NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—A considerable fall in atmospheric pressure occurred over the upper waters of the North Pacific Ocean during December. The result was one of the deepest cyclones of the Aleutian region for the month in recent years, the average pressures in the western part of the Gulf of Alaska and the eastern part of the Bering Sea being about 29.20 inches, or four-tenths of an inch below the December normal. The lowest readings of the month occurred on the 27th, the absolute minimum reported being 28.24 inches, at Dutch Harbor.

In American waters south of the central part of the British Columbia coast line, pressure for the most part was higher than the average, as it was also at the island stations of Midway and Honolulu. The North Pacific anticyclone as a whole occupied all except the upper region of the eastern part of the ocean, and the greater part of the sea elsewhere in middle latitudes between the American and Asiatic coasts.

The following table gives the principal barometric data for several island and coast stations in west longitudes, including Point Barrow on the Arctic Ocean.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, December, 1930

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow ¹	29.86		30.32	1st.	29.44	7th.
Dutch Harbor ¹	29.23	-0.35	29.96	23d.	28.24	27th.
St. Paul ^{1, 2}	29.20	-0.41	29.92	23d.	28.54	27th.
Kodiak ¹	29.19	-0.39	29.58	10th.	28.46	6th.
Midway Island ¹	30.11	+0.07	30.36	29th.	29.84	12th.
Honolulu ³	30.08	+0.07	30.26	30th.	29.87	14th.
Juneau ³	29.67	-0.12	30.16	27th.	29.13	15th.
Tatoosh Island ^{3, 4}	30.13	+0.16	30.46	16th.	29.54	31st.
San Francisco ^{3, 4}	30.17	+0.06	30.44	28th.	29.92	31st.
San Diego ^{3, 4}	30.08	+0.04	30.29	25th.	29.91	2d.

¹ P. m. observations only.² A. m. and p. m. observations.³ For 30 days.⁴ Corrected to 24-hour mean.